

**METHODS AND DEVICES FOR EVALUATING BEAM BLUR IN A  
CHARGED-PARTICLE-BEAM MICROLITHOGRAPHY APPARATUS**

**Abstract of the Disclosure**

5           Methods and devices are disclosed for evaluating the imaging performance  
of a charged-particle-beam (CPB) microlithography apparatus. A measurement  
mark is situated at an object plane, a knife-edged reference mark is situated at an  
image plane, and a beam-limiting diaphragm, defining a beam-limiting aperture, is  
situated downstream of the reference mark. The knife-edged reference mark is  
10       defined as a respective aperture in a scattering membrane. Passage of a charged  
particle beam through the measurement mark produces a beamlet that is scanned  
over the knife-edged reference mark. Charged particles of the beamlet passing  
through the reference mark are not scattered, while charged particles of the beamlet  
passing through the membrane are forward scattered. The diameter of the beam-  
15       limiting aperture can be established such that an axial angle of the beam-limiting  
aperture as measured at the knife-edge is slightly greater than a convergent angle of  
the beamlet at a projection lens. Consequently, the non-scattered charged particles  
pass through the beam-limiting aperture to a detector while most of the forward-  
scattered charged particles are blocked by the beam-limiting diaphragm.

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